

1 Claims

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3 1. Apparatus for connecting to a subsea wellbore,
4 the wellbore having a manifold and a choke body, the
5 apparatus comprising:

6 a frame adapted to land on the manifold;

7 a conduit system having a first end for
8 connection to the choke body and a second end for
9 connection to a processing apparatus;

10 wherein the conduit system comprises a conduit
11 means supported by the frame;

12 wherein the frame comprises at least one frame
13 member that is adapted to land on the manifold in a
14 first stage of the connection and wherein the
15 conduit means is adapted to be brought into fluid
16 communication with the choke body in a second stage
17 of the connection.

18

19 2. Apparatus as claimed in claim 1, further
20 comprising an actuating means mounted on the frame,
21 the actuating means being adapted to bring the
22 conduit means into fluid communication with the
23 choke body.

24

25 3. Apparatus as claimed in claim 2, wherein the
26 actuating means comprises at least one hydraulic
27 cylinder.

28

29 4. Apparatus as claimed in any preceding claim,
30 wherein the conduit means comprises a flexible
31 conduit.

32

1 5. Apparatus as claimed in claim 4, wherein the
2 flexible conduit is arranged to buffer the
3 connection of the conduit means and the choke body.
4

5 6. Apparatus as claimed in claim 4 or claim 5
6 wherein the flexible conduit has an end that is
7 fixed relative to the frame and an opposite end that
8 is moveable relative to the frame.
9

10 7. Apparatus as claimed in any of claims 4 to 6
11 when dependent on claim 2, wherein the actuating
12 means is adapted to move the movable end of the
13 flexible conduit relative to the frame to bring it
14 into fluid communication with the choke body.
15

16 8. Apparatus as claimed in claim 7, wherein the
17 actuation means comprises at least one swivel device
18 that allows movement of the end of the flexible
19 conduit in more than one dimension.
20

21 9. Apparatus as claimed in any of claims 4 to 8,
22 wherein the flexible conduit is resilient.
23

24 10. Apparatus as claimed in claim 9, wherein the
25 flexible conduit is curved to provide resilience.
26

27 11. Apparatus as claimed in claim 10, wherein the
28 direction of movement of the flexible conduit in the
29 second stage of the connection defines an axis of
30 connection and wherein the curvature is in a plane
31 perpendicular to the axis of connection to provide
32 resilience in the connection direction.

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2 12. Apparatus as claimed in any of claims 4 to 11,
3 wherein the conduit means comprises two flexible
4 conduits.

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6 13. Apparatus as claimed in claim 12, wherein each
7 of the two conduits is fixed at a respective end
8 thereof relative to the frame and wherein each of
9 the two conduits has a respective opposite end that
10 is moveable relative to the frame.

11

12 14. Apparatus as claimed in any preceding claim,
13 wherein the conduit system further comprises a
14 secondary conduit that is connected to the interior
15 of the choke body and wherein the conduit means is
16 adapted to connect to the secondary conduit in the
17 second stage of the connection to connect the
18 conduit means to the choke body via the secondary
19 conduit.

20

21 15. Apparatus as claimed in claim 2 or claim 3,
22 wherein the frame comprises a lower frame member and
23 an upper frame member, the conduit means being
24 mounted on the upper frame member, and wherein the
25 actuating means is mounted between the lower and
26 upper frame members and is adapted to move the upper
27 frame member relative to the lower frame member to
28 bring the conduit means into fluid communication
29 with the choke body.

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1 16. Apparatus as claimed in claim 15, wherein the
2 actuating means is adapted to buffer the connection
3 between the conduit means and the choke body.
4

5 17. Apparatus as claimed in claim 1, wherein the at
6 least one frame member of the first connection stage
7 comprises a lower frame member, and wherein the
8 apparatus further comprises an upper frame member,
9 the upper frame member and the lower frame member
10 having co-operating engagement means for landing the
11 upper frame member on the lower frame member.
12

13 18. Apparatus as claimed in claim 17, further
14 comprising buffering means provided on the frame,
15 the buffering means defining a minimum distance
16 between the frame and the tree.
17

18 19. Apparatus as claimed in claim 18, wherein a
19 further buffering means is provided between the
20 lower and upper frame members to define a minimum
21 distance between the lower and upper frame members.
22

23 20. Apparatus as claimed in claim 18 or 19, wherein
24 the buffering means comprises adjustable stops.
25

26 21. Apparatus as claimed in claim 20, wherein the
27 buffering means comprises threaded bolts.
28

29 22. Apparatus as claimed in any of claims 17 to 21,
30 wherein the conduit system comprises a secondary
31 conduit that is connected to the choke body and
32 wherein the conduit means is adapted to connect to

1 the secondary conduit in the second stage of the
2 connection to connect the conduit means to the choke
3 body via the secondary conduit.

4

5 23. Apparatus as claimed in claim 22, wherein the
6 secondary conduit is supported on the lower frame
7 member.

8

9 24. Apparatus as claimed in any preceding claim,
10 wherein the conduit system provides a single
11 flowpath between the choke body and the processing
12 apparatus.

13

14 25. Apparatus as claimed in any of claims 1 to 23,
15 wherein the conduit system provides a first flowpath
16 from the choke body to the processing apparatus and
17 a second flowpath from the processing apparatus to
18 the choke body.

19

20 26. Apparatus as claimed in claim 25, wherein the
21 conduit system comprises a housing and an inner
22 hollow cylindrical member, the inner cylindrical
23 member being adapted to seal within the choke body
24 to define a first flow region through the bore of
25 the cylindrical member and a second separate flow
26 region in the annulus between the cylindrical member
27 and the housing.

28

29 27. Apparatus as claimed in claim 26, wherein the
30 first and second flow regions are adapted to connect
31 to a respective inlet and an outlet of the
32 processing apparatus.

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2 28. Apparatus as claimed in any preceding claim,
3 wherein the processing apparatus is provided on the
4 frame.

5

6 29. Apparatus as claimed in any of claims 1 to 27,
7 wherein the processing apparatus is provided on a
8 separate subsea structure.

9

10 30. Apparatus as claimed in any preceding claim,
11 wherein the processing apparatus comprises at least
12 one of: a pump; a process fluid turbine; injection
13 apparatus; chemical injection apparatus; a fluid
14 riser; measurement apparatus; temperature
15 measurement apparatus; flow rate measurement
16 apparatus; constitution measurement apparatus;
17 consistency measurement apparatus; gas separation
18 apparatus; water separation apparatus; solids
19 separation apparatus; and hydrocarbon separation
20 apparatus.

21

22 31. Apparatus as claimed in any preceding claim,
23 wherein the frame includes guide means that co-
24 operate with guide means provided on the manifold,
25 to align the frame with the manifold.

26

27 32. Apparatus as claimed in any preceding claim,
28 wherein a replacement choke is provided on the
29 frame, the replacement choke being connectable to
30 the conduit system.

31

1 33. A method of connecting a processing apparatus
2 to a subsea wellbore, the wellbore having a manifold
3 and a choke body, the method comprising:

4 landing a frame on the manifold and connecting
5 a conduit system between the choke body and the
6 processing apparatus, the frame supporting a conduit
7 means of the conduit system;

8 wherein the frame comprises at least one frame
9 member that is landed on the manifold in a first
10 connection stage, and wherein the conduit means is
11 brought into fluid communication with the choke body
12 in a second connection stage.

13

14 34. A method as claimed in claim 33, wherein
15 actuating means are mounted on the frame, and
16 wherein the method includes the step of actuating
17 the actuating means to bring the conduit means into
18 fluid communication with the choke body.

19

20 35. A method as claimed in claim 34, wherein the
21 conduit means comprises a flexible conduit, one end
22 of which is moveable relative to the frame, and
23 wherein the method includes actuating the actuating
24 means to move the end of the flexible portion
25 relative to the frame to bring it into fluid
26 communication with the choke body.

27

28 36. A method as claimed in any of claims 33 to 35,
29 wherein the conduit system further comprises a
30 secondary conduit that is connected to the choke
31 body and wherein the method includes the step of

1 connecting the conduit means to the secondary
2 conduit in the second stage of the connection.

3

4 37. A method as claimed in claim 33 or claim 34,
5 wherein the frame comprises a lower frame member and
6 an upper frame member, the conduit means being
7 supported on the upper frame member, wherein the
8 actuating means is mounted between the lower and
9 upper frame members, and wherein the method includes
10 the step of actuating the actuation means to move
11 the upper frame member relative to the lower frame
12 member to bring the conduit means into fluid
13 communication with the choke body.

14

15 38. A method as claimed in claim 33, wherein the at
16 least one frame member of the first connection stage
17 comprises a lower frame member, and wherein the
18 apparatus further comprises an upper frame member,
19 and wherein the method includes the step of landing
20 the upper frame member on the lower frame member.

21

22 39. A method as claimed in claim 38, further
23 including the step of buffering the connection
24 between the choke body and the conduit means.

25

26 40. A method as claimed in claim 39, wherein stop
27 means are provided on the lower frame member, and
28 the connection is buffered by adjusting the stop
29 means to define a minimum distance between the
30 manifold and the lower frame member.

31

1 41. A method as claimed in claim 39 or claim 40,
2 including the further step of buffering the
3 connection between the lower and upper frame members
4 by providing stop means between the lower and upper
5 frame members, the connection being buffered by
6 adjusting the stop means to define a minimum
7 distance between the upper and the lower frame
8 members.

9
10 42. A method as claimed in any of claims 38 to 41,
11 wherein the conduit system comprises a secondary
12 conduit that is connected to the choke body and
13 wherein the method includes the step of connecting
14 the conduit means to the secondary conduit in the
15 second stage of the connection.

16
17 43. A method as claimed in claim 42, wherein the
18 method includes the initial steps of removing the
19 choke bonnet and connecting the secondary conduit to
20 interior of the choke body.

21
22 44. A method as claimed in claim 43, wherein the
23 choke bonnet is removed and the secondary conduit is
24 installed by choke bonnet changing equipment.

25
26 45. A method as claimed in claim 43, wherein the
27 secondary conduit is supported on the lower frame
28 member.

29
30 46. A method as claimed in any of claims 33 to 45,
31 wherein the conduit system provides a first flowpath
32 from the choke body to the processing apparatus and

1 a second flowpath from the processing apparatus to
2 the choke body and wherein the method includes the
3 step of connecting the first and second flow regions
4 to a respective inlet and an outlet of the
5 processing apparatus.

6
7 47. A method as claimed in any of claims 33 to 46,
8 wherein the processing apparatus is provided on the
9 frame, and wherein the method includes the step of
10 connecting the conduit means to the processing
11 apparatus before landing the frame on the manifold.

12
13 48. A method as claimed in any of claims 33 to 46,
14 wherein the processing apparatus is provided on a
15 separate subsea structure and the method includes
16 the step of connecting the conduit means to the
17 processing apparatus after landing the frame on the
18 manifold.

19
20 49. A method as claimed in any of claims 33 to 48,
21 wherein the method includes the step of connecting a
22 replacement choke with the conduit system so that
23 fluids flowing through the conduit system also flow
24 through the replacement choke.

25
26 50. Apparatus for connecting to a subsea wellbore,
27 the wellbore having a manifold and a choke body, the
28 apparatus comprising:

29 a frame having a conduit system, the frame
30 being adapted to land on the tree, the conduit
31 system including a first end which is adapted to
32 connect to the choke body such that the conduit is

1 in fluid communication with the interior of the
2 choke body, and a second end connectable to a
3 processing apparatus;

4 wherein the frame comprises buffering means
5 adapted to buffer the connection between the first
6 end of the conduit system and the choke body.

7

8 51. Apparatus for connecting to a subsea wellbore,
9 the wellbore having a manifold and a choke body, the
10 apparatus comprising:

11 a frame adapted to land on the manifold;

12 a conduit system having a first end for
13 connection to the choke body and a second end for
14 connection to a processing apparatus;

15 wherein at least a part of the conduit system
16 is supported by the frame;

17 wherein the conduit system comprises at least
18 one flexible conduit having an end that is moveable
19 relative to the frame to make up a communication
20 between the processing apparatus and the choke body.

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